SENTECH

SENTECH STC-400 SERIES APPLICATION MANUAL

Sentech STC-400 Series Application Manual

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NOTICE

The information, specifications, descriptions, contained herein are subject to change at anytime without prior notice. Please consult with Sentech or your Authorized Sentech Representative for the latest information on these and other Sentech camera products and accessories.

CONTACT INFORMATION

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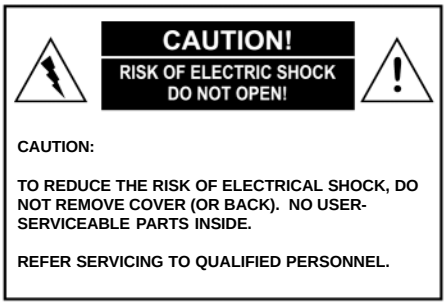
PRECAUTIONS


CAUTION!
RISK OF ELECTRIC SHOCK
DO NOT OPEN!
CAUTION:
TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED PERSONNEL.

- Handle the camera with care. Do not abuse the camera. Avoid striking or shaking it. Improper handling or storage could damage the camera.
- Do not pull or damage camera cable.
- During camera use, do not wrap the unit in any material. This will cause the internal temperature of the unit to increase.
- Do not expose the camera to moisture, or do not try to operate it in wet areas.
- Do not operate the camera beyond its temperature, humidity and power source ratings.
- While camera is not being used, keep lens or lens cap on the camera to prevent dust or contamination from getting in the CCD or filter area and scratching or damaging this area.
- Do not keep the camera under the following conditions
  - In wet, moist and high humidity place
  - Under hot direct sun light
  - In high temperature place
  - Near the object which releases strong magnetic or electric field
  - With strong vibration
- Use soft cloth to clean the camera. Use a cotton swab to clean the surface of the glass. Do not scratch the surface of the glass.

IN THE USA:

WARNING:

This equipment generates and uses radio frequency energy and not installed and used properly, for example, in strict accordance with the instruction manual, may cause harmful interference to communications. It has been tested and found to comply with limits for a Class A computing device pursuant to Subpart J of 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a environment.

IN CANADA:

WARNING:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Interference Regulations of the Canadian Department of Communications.

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Sentech STC-400 Series Application Manual

PREFACE

This camera is designed for visual measurement and microscopic applications. Its very small package design allows it to be installed in places with very limited space. The video output signal is obtained simply by applying 12 volt DC power supply. Various combinations of performance parameters can be obtained by setting the internal switches. These settings will enable the camera to be suitable for many different applications.

CONTENTS OF BOX

A. Standard Contents

Content	Quantity
STC-400 Series Camera	**1 Each**
Instruction Sheet	**1 Each**

B. Optional Items

- HR-10A-10P-12S Power Connector
- Cable Assembly - Available in 2 meter, 3 meter, 5 meter, 10 meter, and custom lengths
- TP-300 Tripod Adapter with 1/4" 20 UNC screw thread hole

FEATURES

STC-400 Series Cameras

The STC-400 series is a collection of products to fit a wide variety of applications. The STC-400 comes in 1/3 and 1/2-inch CCD formats and in compact , remote head, and "L" shaped camera housings. With selectable shutter speeds from 1/60th. to 1/10,000th of a second, the STC-400 can capture scenes and virtually any speed crisply and clearly.

- ***High Picture Quality*** *- 1/2 or 1/3-inch, 380,000 pixel CCD, High resolution picture of 570(H) x 485 (V) TV lines at frame accumulation mode.*
- ***Extremely Small Size*** *- 31(W) x 29(H) x 73(D) mm, Weight 85g (STC-400) [1.22(W) x 1.14(H) x 2.87(D) inch, Weight 3.0 oz]*
- ***Clock Out*** *- 14.31818MHz*
- ***Electronic Shutter*** *- User selectable from 1/60 to 1/10,000 of a second. For clear image of a high-speed moving target.*
- ***Selectable Gamma*** *- 0.45 or 1*
- ***Selectable Gain*** *- Gain is user selectable from 0 to 25dB via the rear panel.*
- ***Selectable Light Accumulation*** *- Field or frame accumulation mode is selectable by the internal switch.*

All STC-400 series cameras are available in EIA and CCIR formats

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STC-400 SERIES PRODUCT FAMILY

Series	Model Number	Product Description
STC-400	**STC-400**	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD Camera
	STC-410	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD Camera
	STC-405	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD Camera
	STC-415	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD Camera
	STC-400A	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD Camera with IR Cut Filter
	STC-410A	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD Camera with IR Cut Filter
	STC-405A	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD Camera with IR Cut Filter
	STC-415A	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD Camera with IR Cut Filter
STC-400L	**STC-400L**	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD “L” Shaped Camera
	STC-410L	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD “L” Shaped Camera
	STC-405L	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD “L” Shaped Camera
	STC-415L	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD “L” Shaped Camera
STC-SS400	**STC-SS400**	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Back*)
	STC-BS400	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Bottom*)
	STC-LS400	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Left*
	STC-RS400	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Right*)
	STC-TS400	EIA, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Top*)
	STC-SS405	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Back*)
	STC-BS405	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Bottom*)
	STC-LS405	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Left*
	STC-RS405	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Right*)
	STC-TS405	CCIR, 1/2-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Top*)
	STC-SS410	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Back*)
	STC-BS410	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Bottom*)
	STC-LS410	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Left*
	STC-RS410	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Right*)
	STC-TS410	EIA, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Top*)
	STC-SS415	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Back*)
	STC-BS415	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Bottom*)
	STC-LS415	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Left*
	STC-RS415	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Right*)
	STC-TS415	CCIR, 1/3-Inch Monohcorme Hi-Resolution CCD Remote Head Camera (Top*)

(* = Cable orientation in relation to the remote head)

OEM Special OEM versions of the STC-400 series are available, Please contact Sentech for more details and information.

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SPECIFICATIONS (General)

STC-400 Series

- STC-400 is 1/2", STC-410 is 1/3"
- B/W 768 (H) x 494 (V) IT CCD
- Available in EIA & CCIR Formats
- 570 TV Lines Horizontal Res.
- 2:1 Interlace / Non-Interlace
- Field / Frame Integration
- Sync: Internal / External
- Gamma 0.45, 1.0 switchable
- Pixel Clock Out
- Gain: Fixed / Manual (0 – 25dB)
- >56 dB S/N Ratio (Gain Off)
- Fixed Shutter (8 steps) 1/60 (1/50) to 1/10,000 sec
- Minimum Illumination 0.1 Lux @ F1.2, Gain ON, 50 IRE
- Available w/ or w/o I/R Filter
- C-Mount Lens Mount
- Dimensions: 31 (W) x 29 (H) x 73 (D) mm
- 12V DC Power

STC-400L Series

- STC-400L is 1/2", STC-410L is 1/3"
- Same basic features and specification as STC-400 Series
- C-Mount Lens Mount
- Dimensions: 31 (W) x 45(H) x 73 (D) mm

STC-SS400 Series

- STC-SS400 is 1/2", STC-SS410 is 1/3"
- Same basic features and specification as STC-400 Series
- C-Mount Lens Mount
- Head Dimensions: 31 (W) x 29 (H) x 38 (D) mm

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SPECIFICATIONS (Continued)

Electrical Specifications

Signal Format	EIA / CCIR	
Image Sensor	1/2 inch Interline CCD	
Total Picture Element	811(H) x 508(V)	
Effective Picture Element	768(H) x 494(V) (EIA)	
Chip Size	7.95mm(H) x 6.45mm(V)	
Cell Size	8.40µm(H) x 9.80µm(V)	
Optical Black	Horizontal, Front: 3 pixel, Back: 40 pixel	
	Vertical, Front: 12 pixel, Back: 2 pixel	
Scanning Area	6.45mm(H) x 4.84mm(V)	
Synchronization System	Internal/External by internal switch	
Scanning system	2:1 interlace	
Horizontal Resolution	570 TVL	
Vertical Resolution	Frame Accumulation:	485TVL
	Field Accumulation:	350TVL
S/N Ratio	Better Than 56dB (Gamma = Off, Gain = 0dB)	
Minimum scene illumination	0.1 Lux @ F1.2, Gain ON, 50 IRE	
Video Out	1.0Vp-p / 75 Ohm	
Power Voltage	10 - 12Vdc	
Power Consumption	Approximately 180mA	
Ambient Temperature	-10 Degrees C - +40 Degrees C	

Image Related Specifications

Accumulation Modes	Frame / field (Internal switch switchable, Factory set up=Field)
Gamma Correction	0.45 / 1 (Internal switch switchable, Factory set up=1)
Gain	Fixed/Manual (0dB – 25dB) switchable
Shutter Speeds	1/60, 1/100, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000 (Factory set up=1/60)

Synchronization Specifications

Internal Sync Mode	Original clock frequency	28.63636MHz
	H. Sync Frequency	15.734KHz
	V. Sync Frequency	59.94Hz
External Sync Mode	Input Signals	HD/VD *(2 Line - Note: Requires 2 line input to select external mode)*
	Input Signal Level	HD/VD 2 – 5Vp-p Negative polarity
	Switchable	75 Ohm or High Impedance
	H. Sync. Allowance	15.734kHz + 1.0%
Sync. Output Signal	HD:	2-5Vp-p
	VD:	2-5Vp-p
	Clock:	2.5Vp-p/75 Ohm, 14.31818MHz
External Output Connector	Hirose 12P connector (HR10-10R-12PA)	

Mechanical Specifications

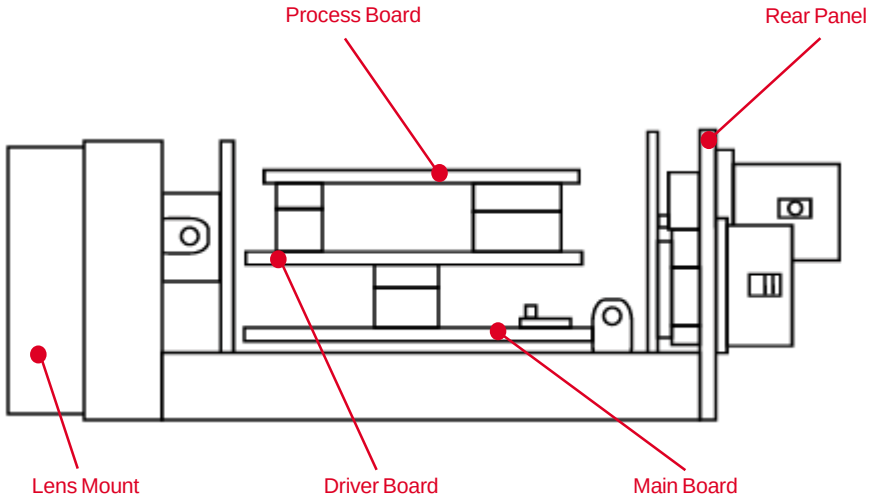
Lens Mount	C-Mount	
Optical Center Allowance	Less than +10%	
Case Color	Black	
Dimensions*	STC-400	31(W) x 29(H) x 73(D)mm
	STC-400L	31(W) x 45(H) x 87(D)mm
Weight*	STC-400	85g
	STC-400L	100g
Vibration Resistance	7G	

** Excluding any camera mounts, connectors, and lens.*

MAJOR OPERATING CONTROLS AND FUNCTIONS

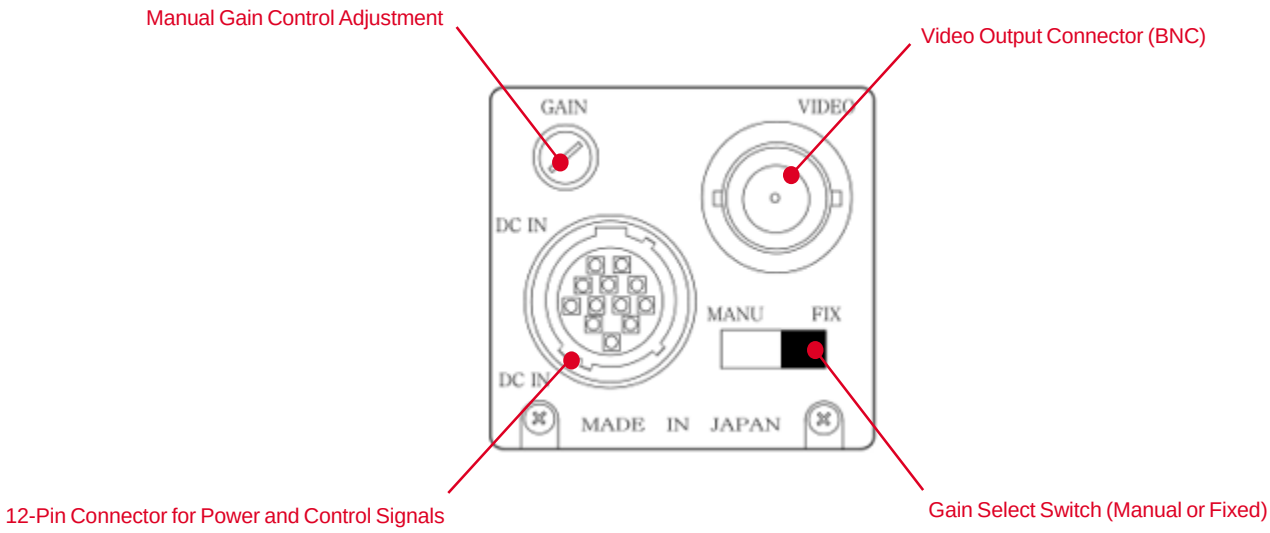
(1) Camera Board Layout

Please remove the cover. The diagram below shows internal structure of the camera. IMPORTANT NOTE: There must be NO power to the camera when removing the cover. Disconnect power before opening the camera or removing the cover.



(2) Rear Panel

The diagram below show the rear panel of the STC-400 series CCD cameras.



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(2) Rear Panel (continued)

(A) **12-Pin Connector for Power and Control Signals**

Connector for power, external sync signals, and video output. This connector is usually connected to power supply, sync signal generator (or sync source), and video monitor. Please see below for the 12-pin connector's pin assignments.

(B) **Manual Gain Control Adjustment**

When the Gain Select Switch is in the "Manual" mode, this gain of the video amplifier is adjusted by turning this adjustment. The user can adjust the gain of the camera from 0 to 25 dB as desired.

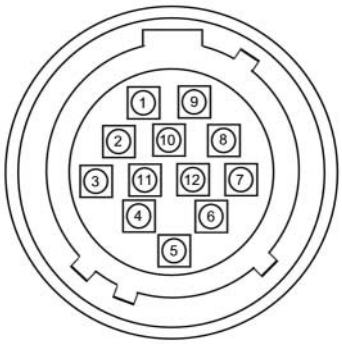
(C) **Gain Select Switch (Manual or Fixed)**

Manual gain mode is selected by setting this switch to the left. Fixed gain is selected by setting this switch to the right (factory setting default). Manual gain value is set by the (B) "Manual Gain Control Adjustment" (see above).

(D) **Video Output Connector (BNC)**

Video signal output connector for the camera's composite monochrome signal.

(3) 12-Pin Connector Pin-Out



Note: The mating connector is the Hirose HR10A-10P-12S

Pin No.	Internal Sync	External Sync
1	GND	GND
2	+12Vdc	+12Vdc
3	Video GND	Video GND
4	Video Out	Video Out
5	HD GND	HD GND
6	HD Out	HD In
7	VD Out	VD In
8	Clock GND	Clock GND
9	Clock Out	Clock Out
10	GND	GND
11	+12Vdc	+12Vdc
12	VD GND	VD GND

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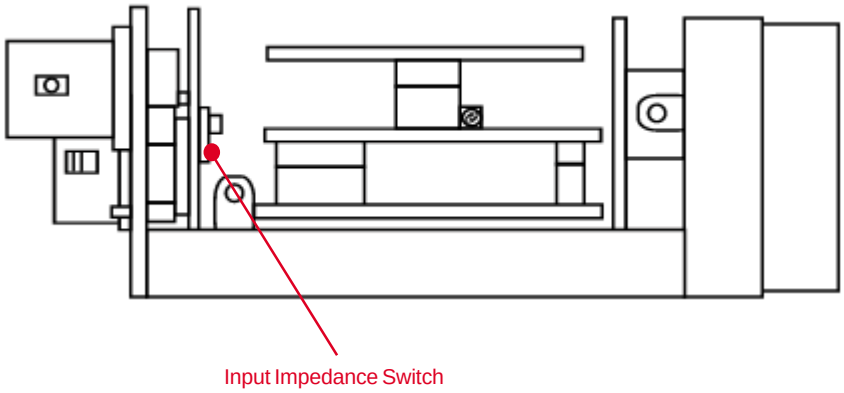
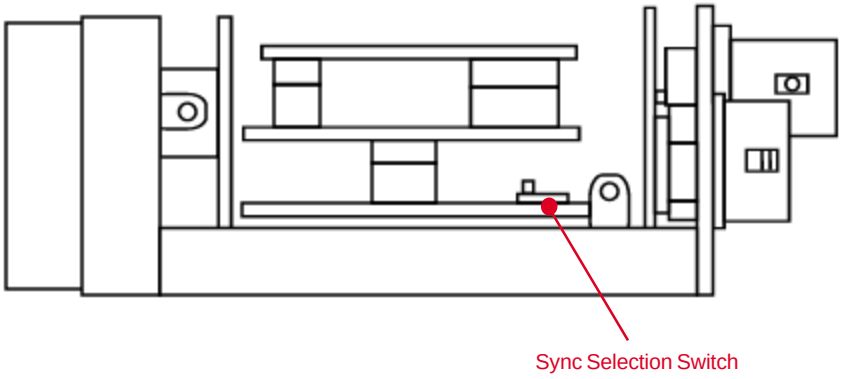
4) Internal Switches

(A) Input Impedance Switch



Up Position: 75 Ohm
Down Position: High Impedance

(B) Synchronization Selection (Internal / External) Switch



Left Position (towards the front of the camera): Internal Synchronization Mode
Right Position (towards the rear of the camera): External Synchronization Mode

Note: When the Sync Selection Switch is set in the external mode position, camera detects existence of external sync input signal. If there is no external sync input signal, the camera switches to internal sync mode automatically.

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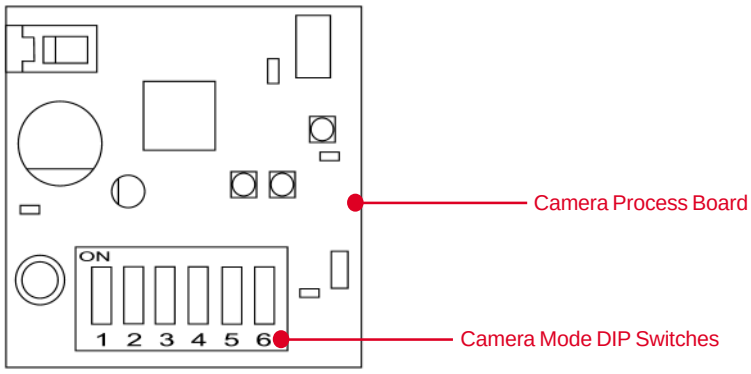
(C) Camera Mode / Operation Switch



(1) Frame Integration Mode

	Shutter Speed		Switch Settings				
Mode	EIA	CCIR	SW1	SW2	SW3	SW4	SW5
Frame	1/30	1/25	Either	Either	Either	OFF	ON
Frame	1/60	1/50	OFF	OFF	OFF	ON	ON
Frame	1/100	1/120	ON	OFF	OFF	ON	ON
Frame	1/250	1/250	OFF	ON	OFF	ON	ON
Frame	1/500	1/500	ON	ON	OFF	ON	ON
Frame	1/1,000	1/1,000	OFF	OFF	ON	ON	ON
Frame	1/2,000	1/2,000	ON	OFF	ON	ON	ON
Frame	1/4,000	1/4,000	OFF	ON	ON	ON	ON
Frame	1/10,000	1/10,000	ON	ON	ON	ON	ON

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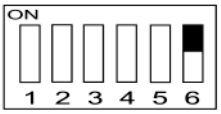
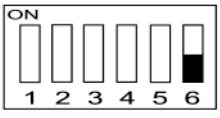
(2) Field Integration Mode

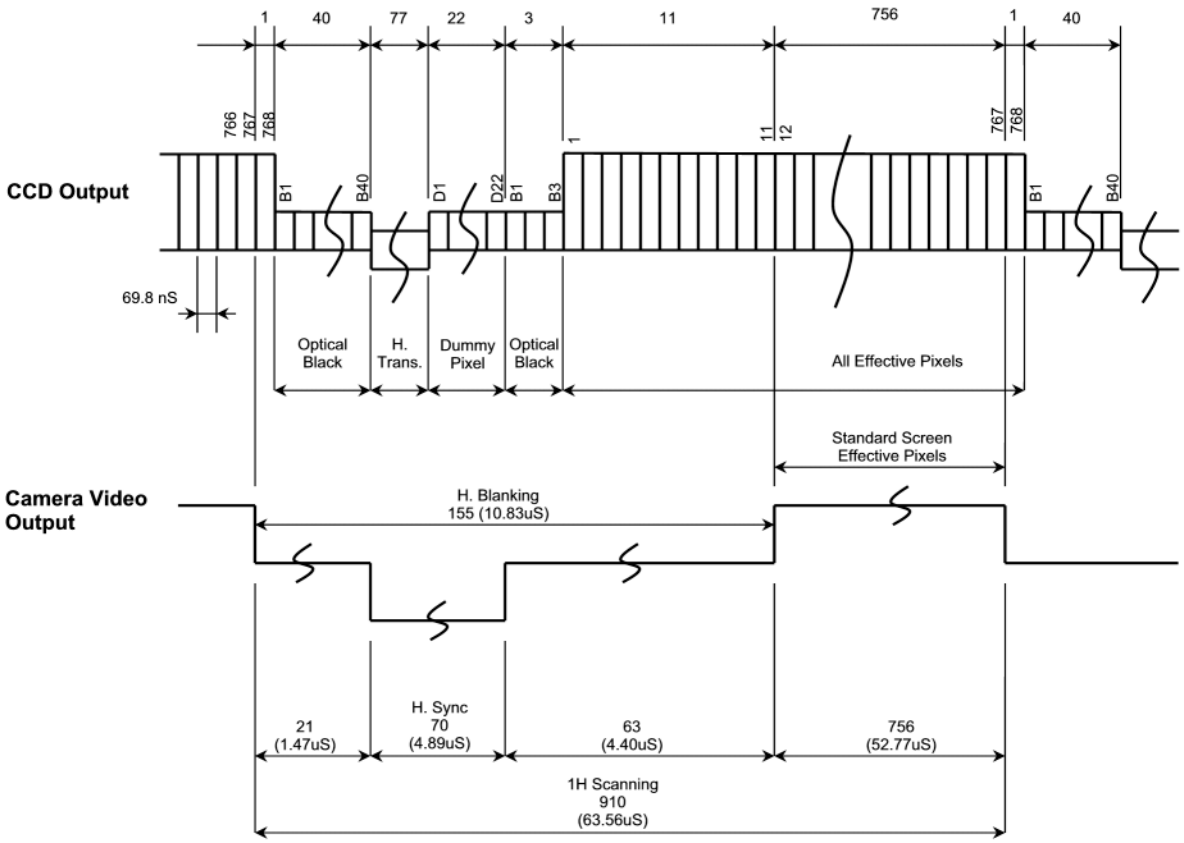
	Shutter Speed		Switch Settings				
Mode	EIA	CCIR	SW1	SW2	SW3	SW4	SW5
Field	1/30	1/25	Either	Either	Either	OFF	OFF
Field	1/60	1/50	OFF	OFF	OFF	ON	OFF
Field	1/100	1/120	ON	OFF	OFF	ON	OFF
Field	1/250	1/250	OFF	ON	OFF	ON	OFF
Field	1/500	1/500	ON	ON	OFF	ON	OFF
Field	1/1,000	1/1,000	OFF	OFF	ON	ON	OFF
Field	1/2,000	1/2,000	ON	OFF	ON	ON	OFF
Field	1/4,000	1/4,000	OFF	ON	ON	ON	OFF
Field	1/10,000	1/10,000	ON	ON	ON	ON	OFF

(3) Setting Gamma (1.0 or 0.45)

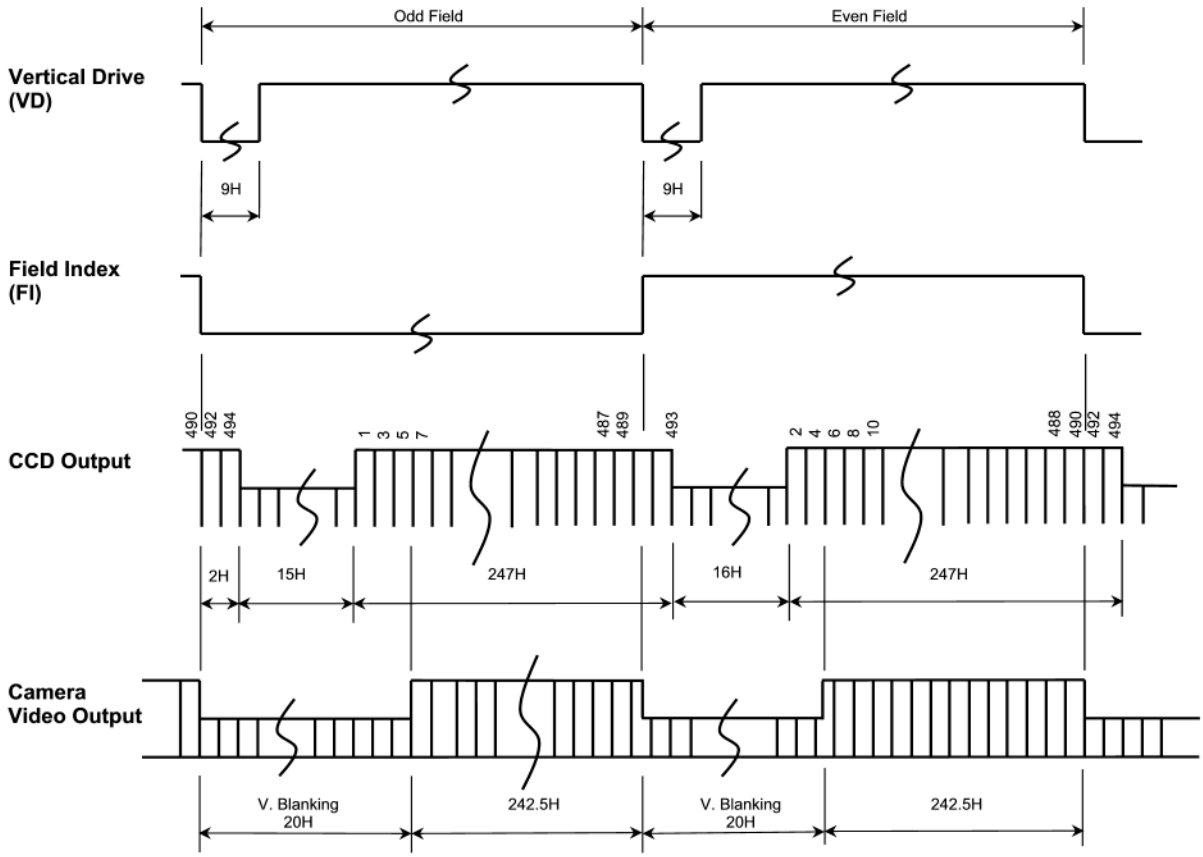
Gamma = 1.0	SW6 = ON	
Gamma = 0.45	SW6 = OFF	

CCD PIXEL CONFIGURATION

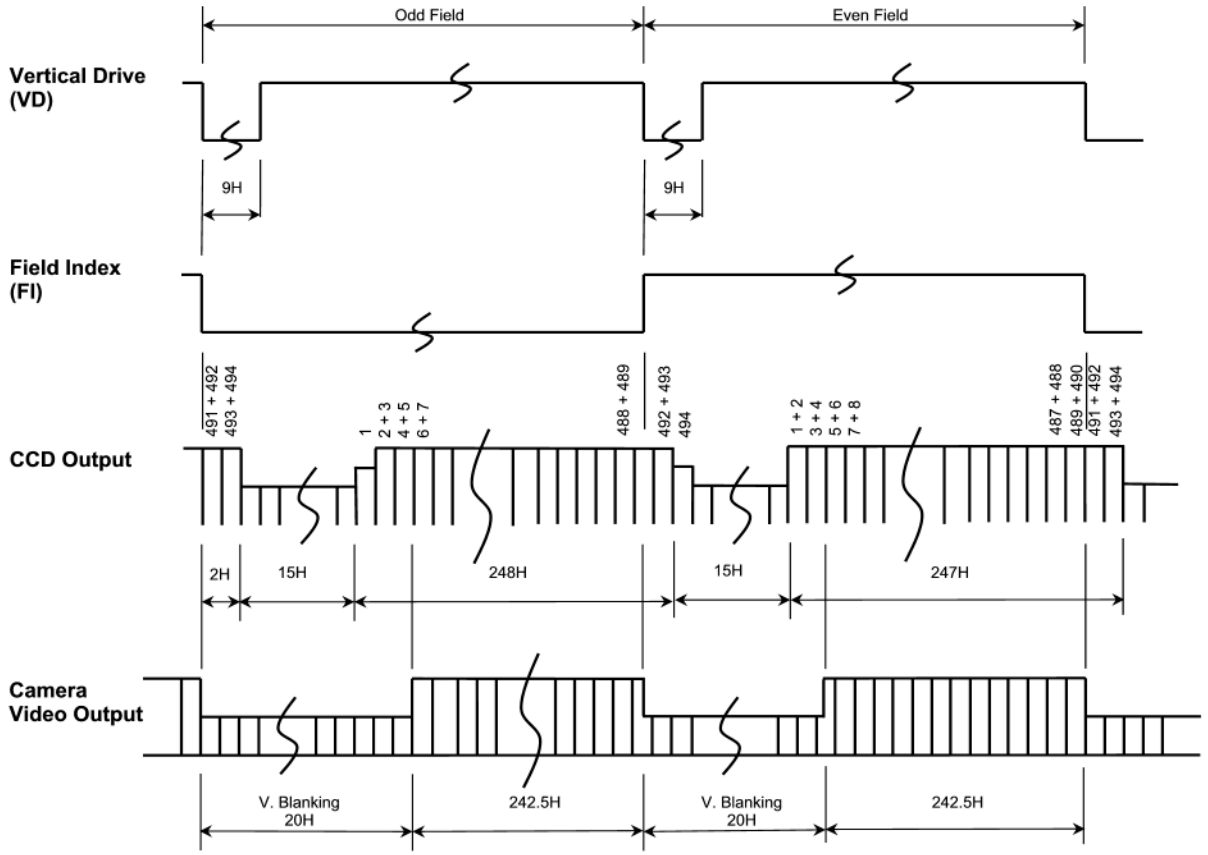
(1) Horizontal Pixel Configuration



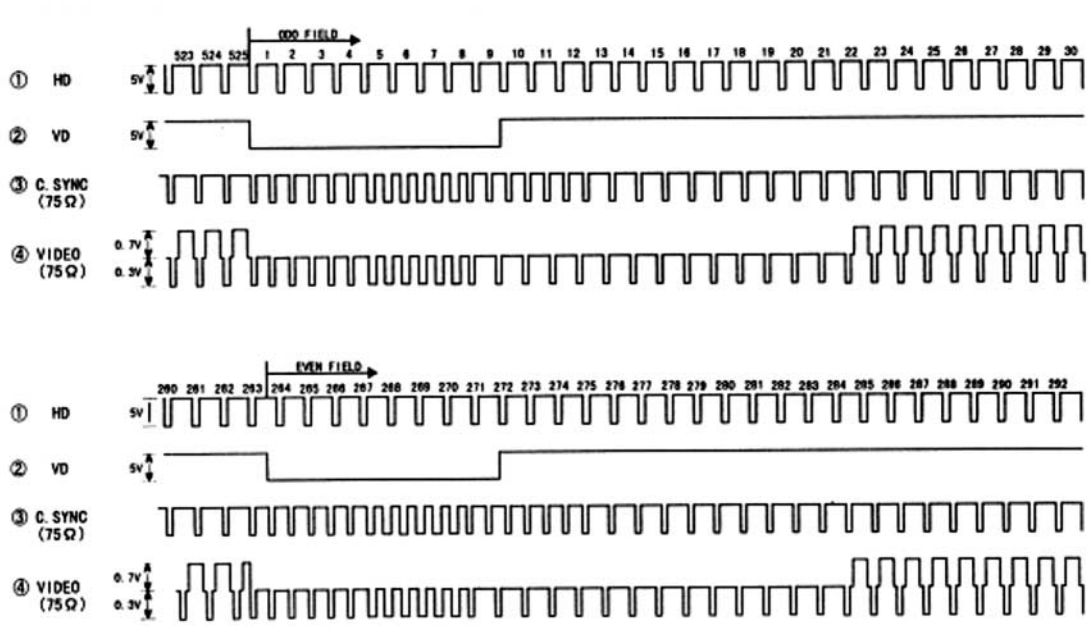
(2) Vertical Pixel Configuration - 2:1 Interlace, Frame Accumulation



(3) Vertical Pixel Configuration - 2:1 Interlace, Field Accumulation



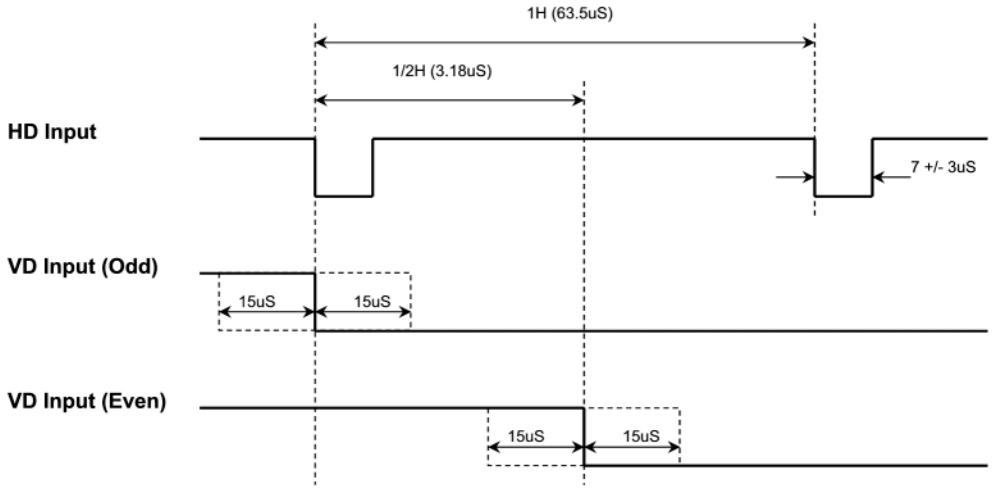
SYNC OUTPUT TIMING CHART



EXTERNAL SYNC INPUT PULSE

HD / VD Inpout Pulse Requirements:

75 Ohm:	4 +/- 1Vp-p
High Impedance (10K Ohm):	5+/- 5Vp-p



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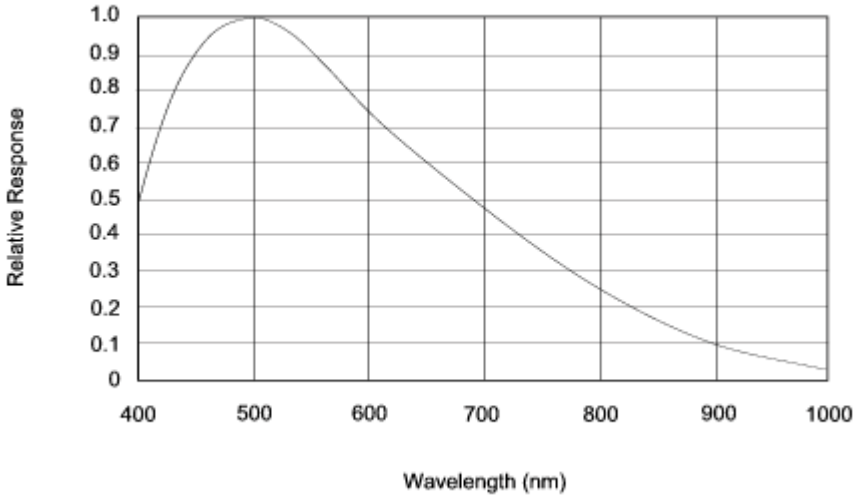
CCD SPECTRUM RESPONSE CURVE



OPTIONAL COMPONENTS AND USE

IR Cut Filter

When the camera is aimed toward a strong light source such as sun or fluorescent light, usually vertical smear appears in the screen. This is a typical phenomenon of interline transfer type CCD. IR cut filter is an effective device to reduce this smear. IR cut filter built-in models are also available.

Power Connector

The mating connector for “12-pin connector for power and control signal” (Hirose: HR10A-10P-12S) is available as an optional part. Please wire all necessary connections according to 6-2.

Pre-Wired Power Connector

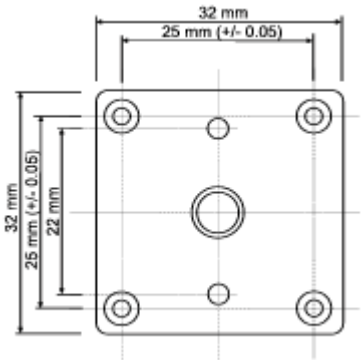
The above mating connector with pre-wired cables is also available as an optional part. This makes connection works to external devices easier.

Tripod Adapter (TP-300)

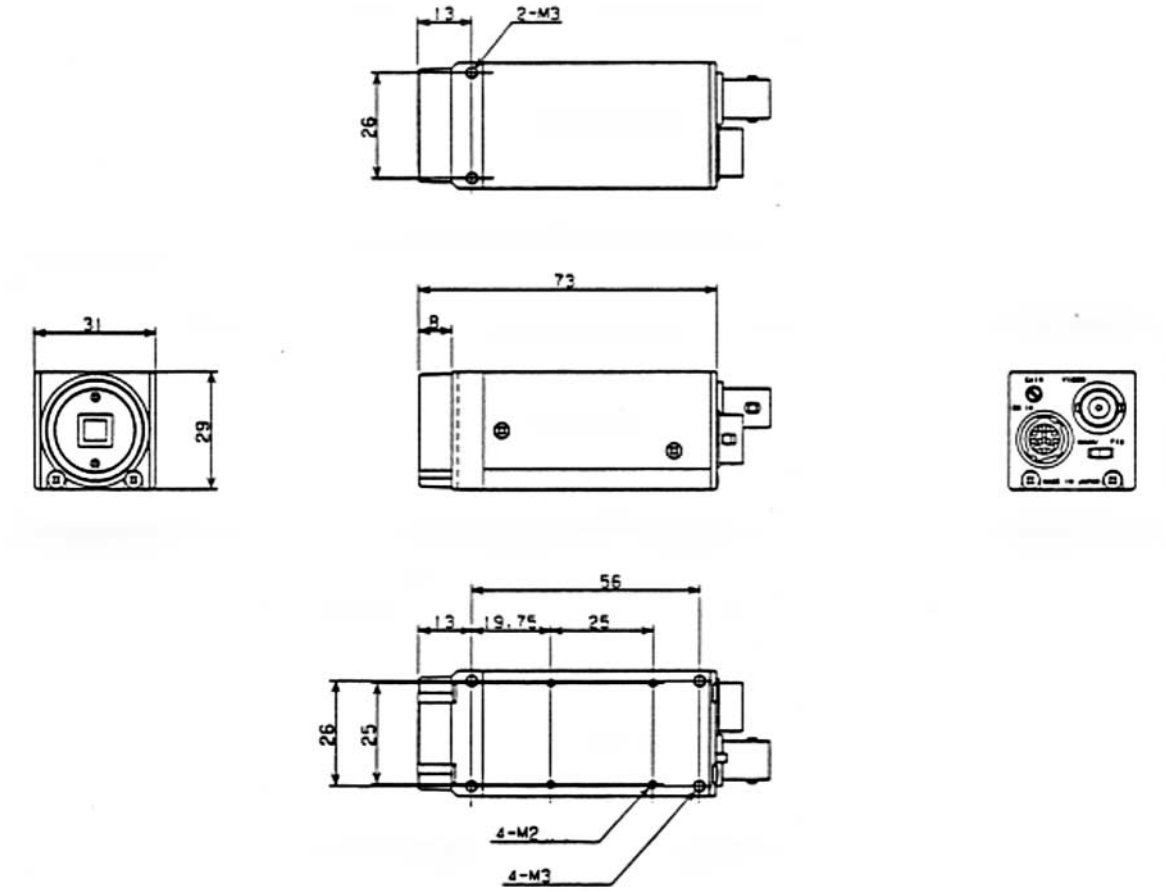
For the easy camera installation, an optional adapter with 1/4" 20 UNC screw thread hole is available. With this adapter, the camera can be installed to standard tripod or other standard camera mounts.

Notes:

1. Requires four (4) each M2 screws to mount the TP-300 to the bottom of the camera. (comes with TP-300 when purchased through Sentech)
2. Maximum length of the four screws must be 7mm

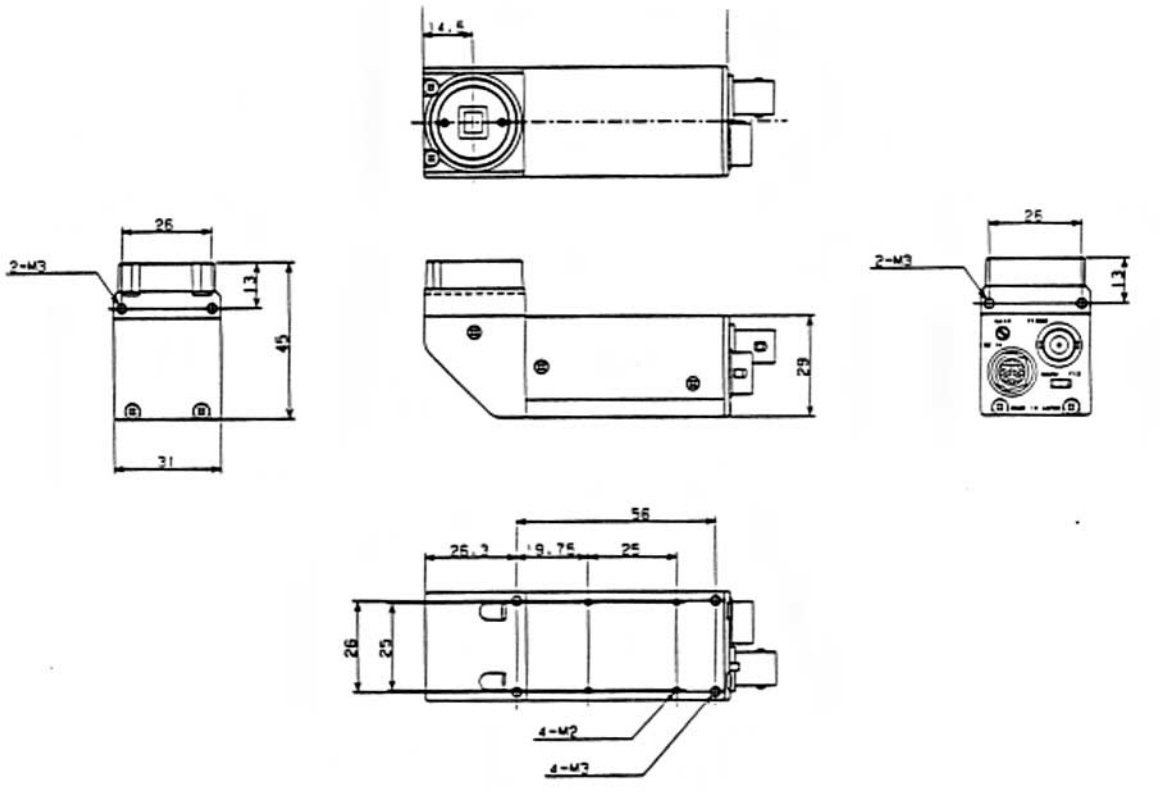


STC-400/405/410/415 CAMERA DIMENSIONS



Units are in mm

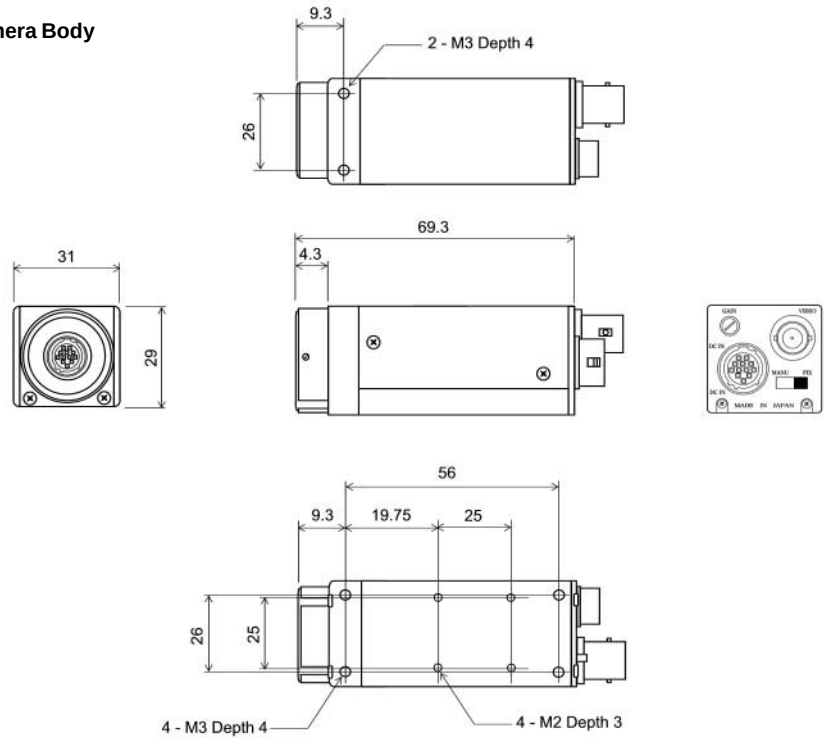
STC-400L/405L/410L/415L CAMERA DIMENSIONS



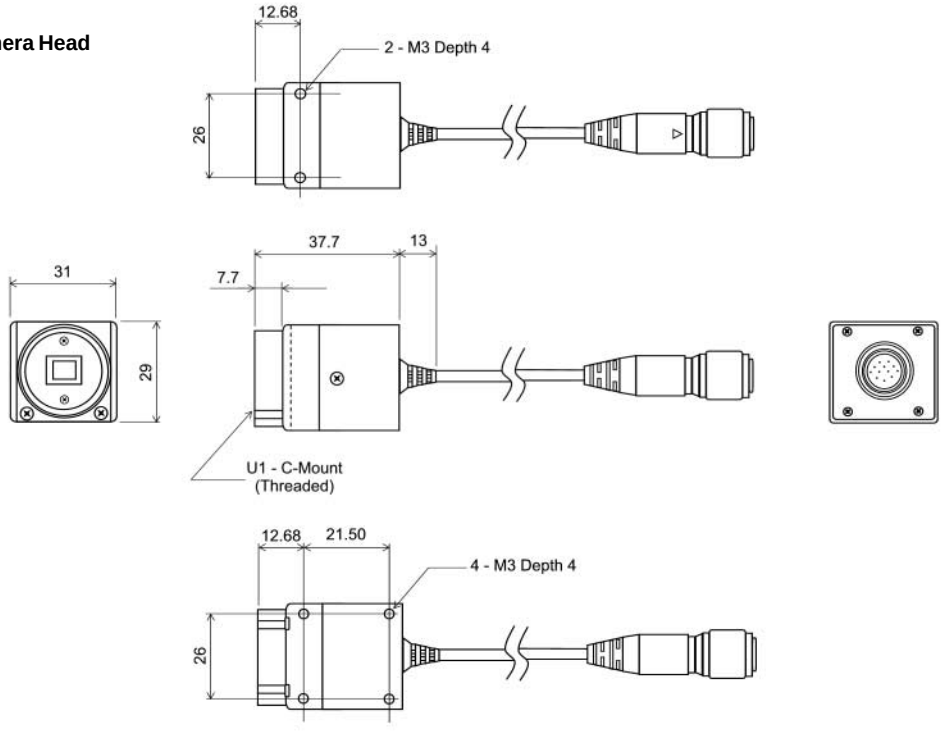
Units are in mm

STC-SS400/405/410/415 CAMERA DIMENSIONS

STC-SS400 Series Main Camera Body



STC-SS400 Series Camera Head



Units are in mm